

1. A process for oligomerizing an alkene stream over
a solid catalyst comprising sulfur and nickel,
wherein the oligomerization is carried out in two
or more successive catalyst zones and the molar
ratio of sulfur to nickel in the first catalyst
zone is less than 0.5 and that in the last
catalyst zone is 0.5 or more and, in the case of
further catalyst zones between the first and last
catalyst zones, the molar ratio of sulfur to
nickel in each catalyst zone is not less than that
in the preceding catalyst zone, based on the main
flow direction of the feed stream.
2. The process according to claim 1, wherein the
molar ratio of sulfur to nickel in the first
catalyst zone is less than 0.4 and that in the
last catalyst zone is more than 0.6.
3. The process according to claim 1 or 2, wherein a
catalyst obtainable by a process in which aluminum
oxide is treated with a nickel compound and a
sulfur compound, either simultaneously or firstly
with the nickel compound and then with the sulfur
compound, and the catalyst obtained in this way is
subsequently dried and calcined and a molar ratio
of sulfur to nickel of from 0.25:1 to 0.38:1 is in
this way set in the finished catalyst is used.
4. The process according to claim 1 or 2, wherein a
catalyst which consists essentially of nickel
oxide, silicon dioxide, titanium dioxide and/or
zirconium dioxide and, if appropriate, aluminum
oxide and has a content, after subtraction of the
loss on ignition after heating at 900°C, of nickel
oxide, calculated as NiO, of from 10 to 70% by
weight, from 5 to 30% by weight of titanium

- dioxide and/or zirconium dioxide, from 0 to 20% by weight of aluminum oxide, from 20 to 40% by weight of silicon dioxide and from 0.01 to 1% by weight of an alkali metal oxide, with the proviso that the proportions of the individual components add up to 100%, and is obtainable by precipitation of an aluminum-free nickel salt solution or a nickel salt solution containing a dissolved aluminum salt at a pH of from 5 to 9 by addition of this nickel salt solution to an alkali metal water glass solution containing solid titanium dioxide and/or zirconium dioxide, drying and heating of the resulting precipitate at from 350 to 650°C is used.
5. The process according to any of claims 1 to 4, wherein the alkene stream used is a mixture of alkenes and alkanes having from 2 to 6 carbon atoms.
6. The process according to any of claims 1 to 5, wherein the alkene stream used is a mixture of butenes and butanes.
7. The process according to any of claims 1 to 6, wherein the alkenes of the alkene stream are reacted to an extent of from 65 to 99% in the first catalyst zone and the alkenes remaining unreacted after this first catalyst zone are reacted to an extent of from 10 to 99% in the remaining catalyst zones.